

OPERATING INSTRUCTIONS FOR HGK-21 ENGINE

The new HGK-21 engine, in succession to the HGK-20 engine, has been designed and manufactured basically for general use with excellent durability and high performance in every stage of speed.
Note carefully that the HGK-21 engine is different from regular engines in the assembly of its cylinder and piston.

CYLINDER

The cylinder and radiation fins are of one block construction. A hard chromium-plating and grinding process are applied on the aluminum alloy material.

PISTON

The piston is made of an aluminum alloy with full heat treatment and silicon process.

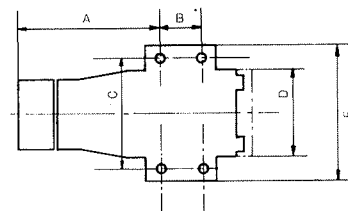
CRANKSHAFT & CONNECTING ROD

The crankshaft is also made of high quality chrome molybdenum steel with full quenching and carbon treatment to ensure its stable performance against the high speed revolution. Furthermore, the connecting rod is made of super duralumin and is press processed for its higher durability.

USE OF HGK-21 ENGINE

| | |
|-----------|---------------------------------|
| HGK-21SF | R/C SPORT & U/C, R/C RACING CAR |
| HGK-21SFC | R/C RACING CAR |
| HGK-21SR | R/C SPORT & R/C BOAT |
| HGK-21SRM | R/C BOAT |

DIMENSION



SPECIFICATIONS OF HGK-21 ENGINE

| TYPE | HGK-21SF | HGK-21SFC | HGK-21SR | HGK-21SRM |
|----------------|-----------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------|-----------|
| | SCHNEURLE SCAVENGED, SIDE EXHAUSTING, FRONT SHAFT VALVE AND 2 BALL BEARINGS | | SCHNEURLE SCAVENGED, SIDE EXHAUSTING, REAR DISK VALVE AND 2 BALL BEARINGS | |
| DISPLACEMENT | 3.5cc | | | |
| BORE x STROKE | 16.3mm x 16.7mm | | | |
| REVOLUTION | 2,500 ~ 22,000r.p.m. | | 2,500 ~ 24,000r.p.m. | |
| WEIGHT | 215g | 270g | 235g | 350g |
| CARBURETTOR | R/C Throttle Carburettor with Regulator | | R/C Throttle Carburettor | |
| ACCESSORY | Sink Head & Air Cleaner | | Flywheel & Joint | |
| DIMENSION (mm) | A=43.8 | B=13 | C=34.5 | D=23 E=43 |

Engine Mount and Installation

Securely install the engine mount in body, chassis or hull with strong metal hardware. Engine must be securely fastened and flush to the engine mount on both side.

Breaking-In Operation

Although you can use the engine without having broken in the engine, it is better to do this in order to give full scope to the performance of the engine.

You have a choice of using either mixed fuel (methanol/castor-oil) or fuel containing a high percentage of nitro-methane. Under the following condition, some comments request to note:

- Airplane.....Breaking-In is not necessary when using less than 16,000r.p.m. Initially, at least 2 hours of operation at less than 16,000r.p.m. is required for maximum performance.
- Car and Boat.....When operating at more than 20,000r.p.m., add 5 percent or more castor oil to fuel mixture.

Plug

Use an adequate plug which fits fuel, purpose, etc., in the various conditions. The manufacturer provides GENUINE HGK PLUGS, that is, "HGK SPORT PLUG", "HGK SPEED PLUG" and "HGK HIGH SPEED PLUG".

Propeller

Use 8" x3" to 10" x6" or propeller with equivalent load.

Muffler (OPTIONAL)

Specially designed and manufactured by HGK to obtain satisfactory results for noise reducing efficiency.

Starting

Needle Valve Setting Start the engine, open the throttle drum fully, and then set the needle valve into full speed position.

Idling And Mixture Controlling Set the mixture controlling pin by clicking to the normal mark on the carburettor body and gradually close the throttle drum with the controlling screw. Set the controlling screw at the position so that it idles at 2,200 to 3,000 r.p.m.
After the controlling screw is set, open the throttle drum fully. Then, put it back to its original position after 10 to 15 seconds. If the engine responds in 1 second, then the regulating has been done correctly.

ADDITIONAL REMARKS

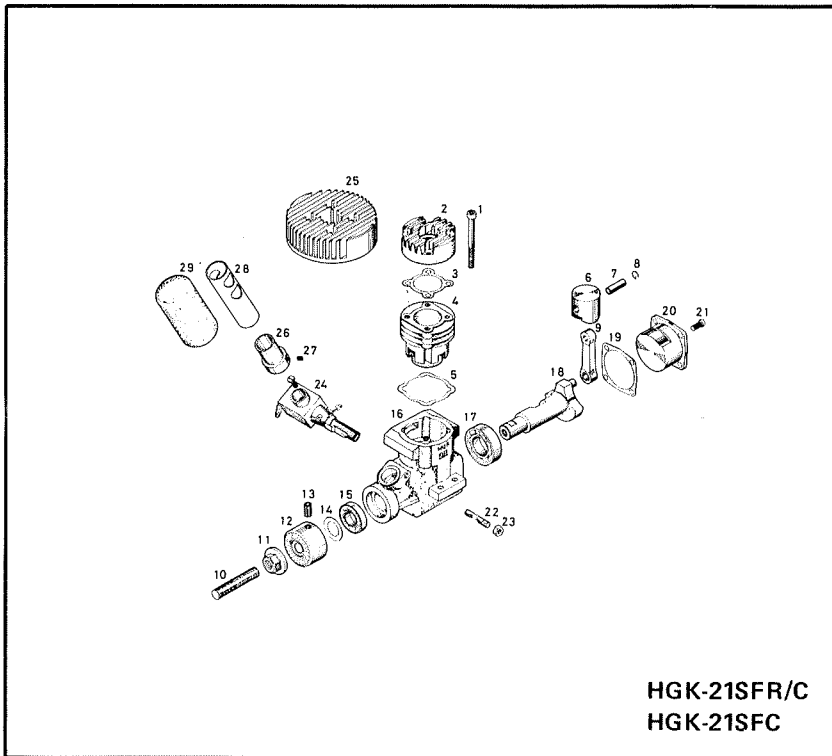
Hesitating Response From Low Speed To High Speed

Your engine with rich mixture setting requires that the mixture controlling pin should be moved very slightly from the normal mark clockwise to find the peak r.p.m. setting.
(Or inserting a screwdriver into the nut of the drum-center and turning very slightly clockwise.)

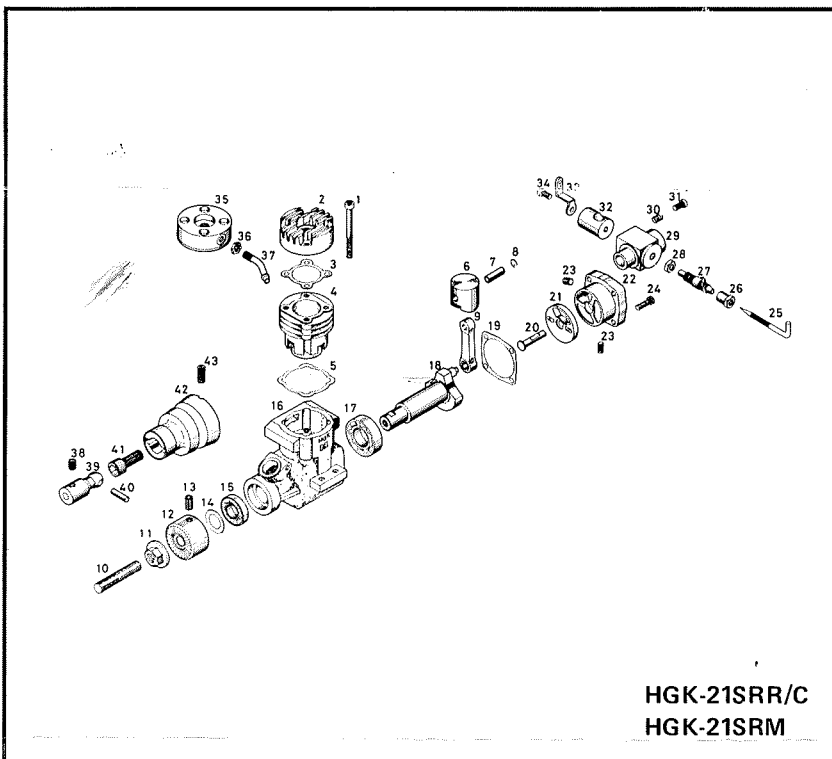
The Engine Stops When Throttle Carburettor Is Fully Opened

Your engine with rarefied mixture setting requires that the mixture controlling pin should be moved very slightly from the normal mark counter-clockwise to find the peak r.p.m. setting.

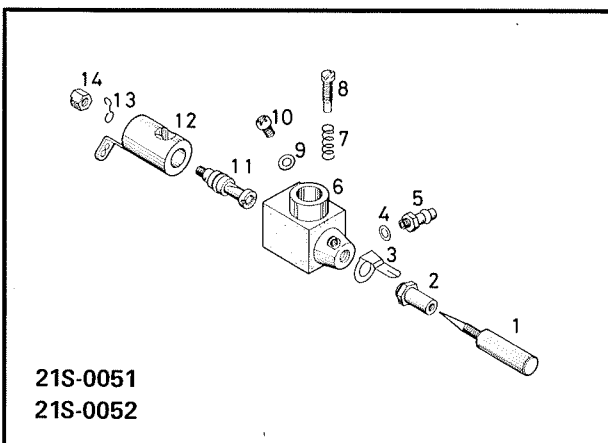
ILLUSTRATIONS AND PARTS LIST FOR HGK-21 ENGINE



| Illustration | Code No. | Description |
|--------------|-----------|---------------------------------------|
| 1,13,21 | 20S-9001 | Screw & Wrench Set |
| 2 | 21S-2004 | Cylinder Head (For 21SF R/C use) |
| 3,5,19 | 21SR-9002 | Gasket & Packing Set |
| 4,6,7,8,9 | 21S-2000 | Cylinder Assembly |
| 4,6 | 21S-20001 | Cylinder & Piston Assembly |
| 7 | 21S-2007 | Piston Pin |
| 8 | 15R-2008 | Retainer Spring |
| 9 | 15R-2009 | Connecting Rod |
| 10,11 | 21S-3001 | Propeller Shaft & Nut |
| 12,13 | 21S-3002 | Drive Washer |
| 14 | 15R-3003 | Thrust Washer Set |
| 15 | 15R-1102 | Ball Bearing |
| 16 | 21S-1001 | Crank Case |
| 17 | 20S-1102 | Ball Bearing |
| 18 | 21S-1103 | Crank Shaft |
| 20 | 20S-1201 | Crank Case Cap |
| 22,23 | 20S-1006 | Carburettor Lock Pin |
| 24 | 21S-0051 | Throttle Assembly |
| 24 | 21S-0052 | High Power Throttle Assembly (Option) |
| 25 | 21S-6001 | Heat Sink Head (For 21SFC use) |
| 26,27 | 21S-6002 | Air Cleaner Body (For 21SFC use) |
| 28,29 | 21S-6004 | Air Cleaner Element (For 21SFC use) |



| Illustration | Code No. | Description |
|--------------|-----------|---------------------------------------------|
| 1,13,23,24 | 21SR-9001 | Screw & Wrench Set |
| 2 | 21S-2004 | Cylinder Head (For 21SR R/C use) |
| 3,5,19 | 21SR-9002 | Gasket & Packing Set |
| 4,6,7,8,9 | 21S-2000 | Cylinder Assembly |
| 4,6 | 21S-20001 | Cylinder & Piston Assembly |
| 7 | 21S-2007 | Piston Pin |
| 8 | 15R-2008 | Retainer Spring |
| 9 | 15R-2009 | Connecting Rod |
| 10,11 | 21S-3001 | Propeller Shaft & Nut |
| 12,13 | 21S-3002 | Drive Washer |
| 14 | 15R-3003 | Thrust Washer Set |
| 15 | 15R-1102 | Ball Bearing |
| 16 | 21SR-1001 | Crank Case |
| 17 | 20S-1102 | Ball Bearing |
| 18 | 21SR-1103 | Crank Shaft |
| 20 | 15R-1203 | Valve Shaft |
| 21 | 21SR-1202 | Disk Valve |
| 22,23 | 20R-1201 | Rear Housing |
| 25-----34 | 20R-0051 | Throttle Assembly |
| 25 | 15R-5002 | Needle Valve |
| 25,26,27,28 | 15S-5103 | Needle Set |
| 35,36,37 | 21SR-6101 | Water Cooling Head Assembly (For 21SRM use) |
| 38-----43 | 21SR-6104 | Flywheel & Joint Assembly (For 21SRM use) |



| Illustration | Code No. | Description |
|--------------|----------|-------------------------------------------|
| 1,2,3,4,5 | 21S-5100 | Needle Set |
| 1 | 21S-5107 | Needle Valve |
| 4,5 | 21S-5103 | Refuelling Nipple |
| 7,8 | 21S-5105 | Drum Controlling Screw |
| 9,10 | 21S-5118 | Blinding Screw |
| 11,12,13,14 | 21S-5111 | Throttle Drum Assembly (For 21S-0051 use) |
| 11,12,13,14 | 21S-5211 | Throttle Drum Assembly (For 21S-0052 use) |
| 13 | 21S-5115 | Mixture Controlling Pin |